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IS 3347-5-2 (1979): Dimensions for Porcelain Transformer Bushings for Use in Normal and Lightly Polluted Atmospheres - Part V : 36 kV Bushings, Section 2: Metal Parts [ETD 6: Electrical Insulators and Accessories]



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“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

DIMENSIONS FOR PORCELAIN TRANSFORMER
BUSHINGS FOR USE IN NORMAL AND
LIGHTLY POLLUTED ATMOSPHERES

PART V 36 kV BUSHINGS

Section 2 Metal Parts

(First Revision)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

DIMENSIONS FOR PORCELAIN TRANSFORMER BUSHINGS FOR USE IN NORMAL AND LIGHTLY POLLUTED ATMOSPHERES

PART V 36 kV BUSHINGS

Section 2 Metal Parts

(*First Revision*)

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IS : 3347 (Part V/Sec 2) - 1979

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Indian Standard

DIMENSIONS FOR PORCELAIN TRANSFORMER BUSHINGS FOR USE IN NORMAL AND LIGHTLY POLLUTED ATMOSPHERES

PART V 36 kV BUSHINGS

Section 2 Metal Parts

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part V/Sec 2) (First Revision) was adopted by the Indian Standards Institution on 28 December 1979, after the draft finalized by the Electrical Insulators and Accessories Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 The dimensions of porcelain parts of the bushings for use in normal and lightly polluted atmospheres of 36 kV are covered in IS : 3347 (Part V/Sec 1)-1979*. This Section 2, which is a necessary adjunct to Section 1, lays down the dimensions of the metal parts and accessories of the bushing to go with the porcelain parts specified in Section 1. The materials for the metal parts and accessories have also been specified.

0.3 This standard was first issued in 1967. This revision, which incorporates two amendments issued to its earlier edition, has been undertaken to include metal parts of 2 000A and 3 150A bushings.

0.4 The need for changing over to aluminium for the metal parts of bushings has been fully recognized. This section, therefore, includes dimensions of parts using aluminium as well as copper. Dimensions for copper parts have been given to ensure a smooth changeover to aluminium. These are expected to be deleted in due course.

*Dimensions for porcelain transformer bushings : Part V 36 kV Bushings, Section 1 Porcelain parts (*first revision*).

0.5 In this section, the dimensions of metal parts have been formulated in such a way that the porcelain parts available in Section 1 of this standard may be used both for aluminium and copper metal parts. Suitable references are given to indicate the appropriate porcelain part at each place.

0.6 For current rating of 3 150A, no aluminium metal parts have been specified. In such a case, the use of copper metal parts only is recommended.

0.7 The dimensions of bushings for other voltages are covered by the following parts of this standard:

Part I Up to and including 1 kV bushings

Section 1 Porcelain parts

Section 2 Metal parts

Part II 3.6 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts

Part III 12 and 17.5 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts

Part IV 24 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts

Part VI 72.5 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts (*under preparation*)

Part VII 123 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts (*under preparation*)

0.8 The dimensions of porcelain transformer bushings for use in heavily polluted atmosphere are covered by the series of IS : 8603*. The metal parts covered by this section may be used for bushings covered by IS : 8603.

*Dimensions of porcelain transformer bushings for use in heavily polluted atmospheres.

0.9 In the preparation of this standard, assistance has been derived from the following DIN standards issued by Deutscher Normenausschuss:

DIN 42531 (1968) Indoor and outdoor transformer bushings, insulation class 10 to 30 kV, 250A

DIN 42532 (1969) Indoor and outdoor transformer bushings, insulation class 10 to 30 kV, 630A

DIN 42533 (1969) Indoor and outdoor transformer bushings, insulation class 10 to 30 kV, 1 000 to 3 150A

0.10 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This Standard (Part V/Sec 2) lays down the dimensions and materials of metal parts and accessories of bushings for use in normal and lightly polluted atmospheres of 36 kV used with transformers.

2. MATERIALS

2.1 The material of the various parts shall conform to the relevant Indian Standards specified below:

<i>* Metal Part or Accessory</i>	<i>For Bushing with Copper Stem</i>	<i>For Bushing with Aluminium Stem</i>
Hexagonal nuts (for stem)	Material brass screw threads conforming to Class 2.2 of IS : 1364-1967† and IS : 3138-1966‡ with a minimum tensile strength of 300 N/mm ²	Material aluminium alloy screw threads conforming to Class 2.2 of IS : 1364-1967†
	<i>Finish</i> : Electroplated to IS : 1359-1977§	

*Rules for rounding off numerical values (*revised*).

†Specification for precision and semi-precision hexagon bolts, screws, nuts and lock nuts (diameter range 6 to 39 mm) (*first revision*).

‡Specification for hexagonal bolts and nuts (M42 to M150).

§Specification for electroplated coatings of tin (*second revision*).

<i>Metal Part or Accessory</i>	<i>For Bushing with Copper Stem</i>	<i>For Bushing with Aluminium Stem</i>
Stem (see Fig. 1, 2 & 3)	For 250 A rated bushing brass of Grade 3 to IS : 292-1961*	Aluminium conforming to electrical grade of IS : 4026-1969† or any other suitable alumin- ium alloy
	For other ratings high conductivity copper to ETP grade copper of IS : 191-1967‡ and properties to IS : 613- 1964§	
	<i>Finish</i> : Electrotinned to IS : 1359-1977	<i>Finish</i> : Electrotinned to IS : 1359-1977
Cap (see Fig. 4, 5 & 6)	Brass to Grade 3 of IS : 292-1961*	Aluminium conforming to electrical grade of IS : 4026-1969†, or any other suitable alumin- ium alloy
	<i>Finish</i> : Electrotinned to IS : 1359-1977	<i>Finish</i> : Electrotinned to IS : 1359-1977
Upper spark gap horn (see Fig. 7, 8 & 9)	Steel designation C 20 of IS : 2073-1970¶	Steel designation C 20 of IS : 2073-1970¶
	<i>Finish</i> : Bright to be galvanized as per IS : 4759-1968**	<i>Finish</i> : Bright
Lower spark gap horn (see Fig. 10)	Steel designation C 20 of IS : 2073-1970¶	Steel designation C 20 of IS : 2073-1970¶
	<i>Finish</i> : Bright to be galvanized according to IS : 4759-1968**	<i>Finish</i> : Bright

*Specification for brass ingots and castings (revised).

†Specification for aluminium ingots (EC grade) (first revision).

‡Specification for copper (second revision).

§Specification for copper rods for electrical purposes (revised).

||Specification for electroplated coatings of tin (second revision).

¶Specification for carbon steel black bars for production of machined parts for general engineering purposes (first revision).

**Specification for hot-dip zinc coatings on structural steel and other allied products.

<i>Metal Part or Accessory</i>	<i>For Bushing with Copper Stem</i>	<i>For Bushing with Aluminium Stem</i>
Spark gap horn carrier (<i>see</i> Fig. 11)	Brass conforming to Grade 3 of IS : 292-1961*	Aluminium alloy A-6-M designation of IS : 617-1975†
Sealing washer for stem (<i>see</i> Fig. 12, 13 & 14)	Oil resistant nitrile rubber made from vulcanized butadiene/acrylonitrile rubber compound having a hardness of 70 ± 5 IRHD	Oil resistant nitrile rubber made from vulcanized butadiene/acrylonitrile rubber compound having a hardness of 70 ± 5 IRHD
Separator (<i>see</i> Fig. 15, 16 & 17) and Sealing washer for general purpose Type-M (<i>see</i> Fig. 22)	Oil resistant asbestos fibre jointing to Grade B/O of IS : 2712-1971‡	Oil resistant asbestos fibre jointing to Grade B/O of IS : 2712-1971‡
Vent plug (<i>see</i> Fig. 18 & 19)	For 630 A rating. It is to be made out of slotted cheese head screw AM 8×15 conforming to IS : 1366-1968§ Material — Brass. For 1 000, 2 000, 3 150A bushing rating to be made from slotted cheese head brass screw AM6×15 to IS : 1366-1968§	To be made from allotted cheese head aluminium screw AM6×15 to IS : 1366-1968§
Sealing washer for general purpose (<i>see</i> Fig. 20 & 21) and Sealing washer Type N (<i>see</i> Fig. 22)	Nitrile rubber or nitrile rubber bonded cork to Type C Grade RC-70C of IS : 4253 (Part II)-1968	Nitrile rubber or nitrile rubber bonded cork to Type C Grade RC-70C of IS : 4253 (Part II)-1968

*Specification for brass ingots and castings (*revised*).

†Specification for aluminium and aluminium alloy ingots and castings for general engineering purposes (*second revision*).

‡Specification for compressed asbestos fibre jointing (*first revision*).

§Specification for slotted cheese head screws (dia range 1.6 to 20 mm) (*revised*).

||Specification for cork composition sheets : Part II Cork and rubber.

IS : 3347 (Part V/Sec 2) - 1979

<i>Metal Part or Accessory</i>	<i>For Bushing with Copper Stem</i>	<i>For Bushing with Aluminium Stem</i>
Connecting lug (see Fig. 23)	For 1 000 and 2 000A rated bushings Brass to Grade 3 of IS : 292- 1961* or to IS : 3488- 1966† For 3 150A rated bushing copper chromium alloy forging having the follo- wing characteristics a) Electrical conductivity at 20°C <i>Min</i> 81 percent IACS (47 Sm/mm²) b) Tensile strength, <i>Min</i> 370N/mm² c) Brinell Hardness 5/250, <i>Min</i> 125 HB d) Chemical composition; chromium 0.3 to 1.2 per- cent total impurities 0.3 percent, remainder copper <i>Finish</i> : Electroplated to IS : 1359-1977‡	Aluminium alloy having the following proper- ties: a) Electrical conducti- vity at 20°C <i>Min</i> 43 percent IACS (25Sm/ mm²) b) Tensile strength, <i>Min</i> 300 N/mm² c) Brinell Hardness 5/250, <i>Min</i> 100 HB <i>Finish</i> : Electroplated to IS : 1359-1977‡)
Collar (see Fig. 24)	Grade 3 of IS : 292-1961*	At alloy to A-6-M desig- nation of IS : 617- 1975§
Retaining ring (see Fig. 26)	Annealed copper wire	Annealed aluminium wire
U-link ring (see Fig. 27)	Phosphor bronze Grade 3 HE to IS : 7814-1975	Phosphor bronze Grade 3 HE to IS : 7814-1975

*Specification for brass ingots and castings (revised).

†Specification for brass, bars, rods and sections suitable for forging.

‡Specification for electroplated coatings of tin (second revision).

§Specification for aluminium and aluminium alloy ingots and castings for general engineering purposes (second revision).

||Specification for phosphor bronze sheet, strip and foil.

<i>Metal Part or Accessory</i>	<i>For Bushing with Copper Stem</i>	<i>For Bushing with Aluminium Stem</i>
T-bracket (see Fig. 28)	Steel to Grade Fe410-S (St 42-S) of IS : 226- 1975*	Steel to Grade Fe 410-S (St 42-S) of IS : 226- 1975*
	<i>Finish : Zinc plated and passivated or hot-dip galvanized to IS : 4759- 1968†</i>	<i>Finish : Zinc plated and passivated or hot-dip galvanized to IS : 4759- 1968†</i>
Gasket ring (see Fig. 25)	PTFE or polyamide	PTFE or Polyamide

2.2 The material used for sealing washers general purposes shall be synthetic rubber or synthetic rubber bonded cork. The material used for sealing washers for stem shall be synthetic rubber (acrylic nitrile rubber) having hardness of 70 ± 5 IRHD. Where synthetic insulating transformer coolant is used, the material of the washer shall be silicone rubber or any other resilient material compatible with the transformer coolant.

3. TOLERANCES

3.1 Unless otherwise specified, allowable tolerance on dimensions of any machined metal part shall be in accordance with medium class of IS : 2102-1969†.

3.2 Unless otherwise specified, allowable tolerance on dimensions of any, forged or cast metal part shall be in accordance with the coarse class of IS : 2102-1969†.

4. METAL PARTS AND ACCESSORIES

4.1 Hexagonal Nuts — The hexagonal nuts used shall conform to IS : 1364-1967§ and IS : 3138-1966||. The threads shall be in accordance with IS : 1362-1962¶ and IS : 3139-1966**.

*Specification for structural steel standard quality (*fifth revision*).

†Specification for hot-dip zinc coatings on structural steel and other allied products.

‡Specification for allowable deviations for dimensions without specified tolerances (*first revision*).

§Specification for precision and semi-precision hexagon bolts, screws, nuts and lock nuts (diameter range 6 to 39 mm) (*first revision*).

||Specification for hexagonal bolts and nuts (M42 to M150).

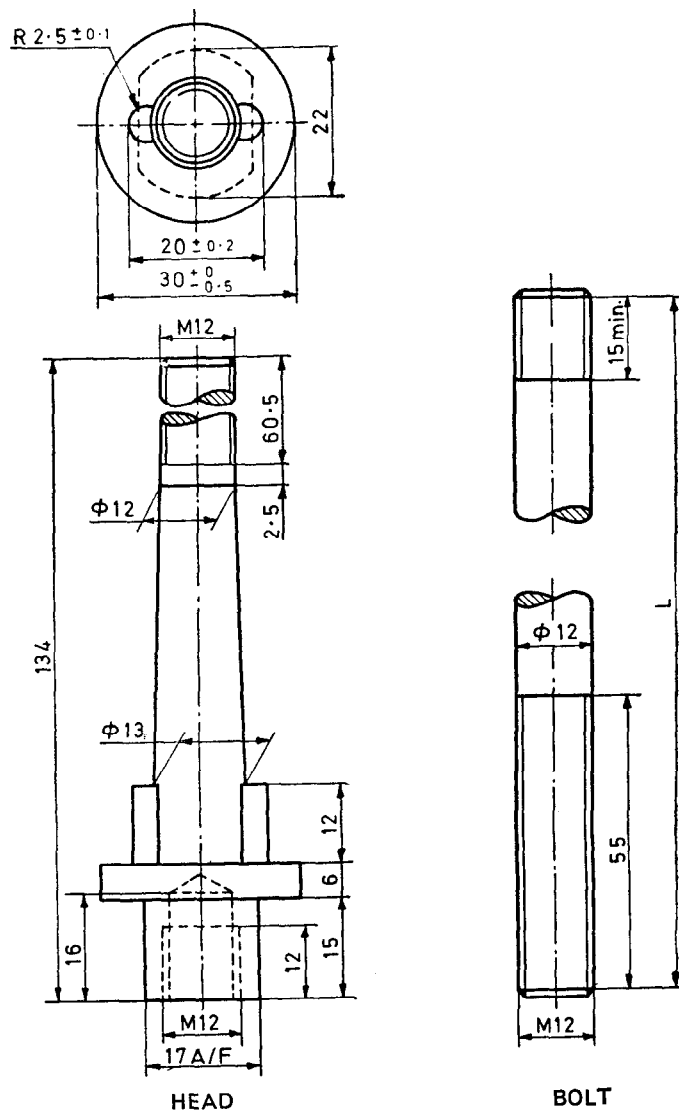
¶Dimensions for screw threads for general purposes (diameter range 1.6 to 39 mm) (*revised*).

**Dimensions for screw threads for bolts and nuts (diameter range M42 to M150).

4.2 The dimensions of the following metal parts and accessories for bushings with copper and aluminium stems corresponding to the various current ratings shall be in accordance with Table 1.

TABLE 1 DIMENSIONS OF METAL PARTS

PART/ ACCESSORY	METAL OF STEM	CURRENT RATING, A				
		250	630	1 000	2 000	3 150
Stem	Aluminium	Fig. 1	Fig. 3	Fig. 3	Fig. 3	—
	Copper	Fig. 1	Fig. 2	Fig. 3	Fig. 3	Fig. 3
Cap	Aluminium	Fig. 4	Fig. 6	Fig. 6	Fig. 6	—
	Copper	Fig. 4	Fig. 5	Fig. 6	Fig. 6	Fig. 6
Upper spark gap horn	Aluminium	Fig. 7	Fig. 9	Fig. 9	Fig. 9	—
	Copper	Fig. 7	Fig. 8	Fig. 9	Fig. 9	Fig. 9
Lower spark gap horn	Aluminium	—	Fig. 10	Fig. 10	Fig. 10	—
	Copper	—	—	Fig. 10	Fig. 10	Fig. 10
Spark-gap horn carrier	Aluminium	—	Fig. 11	Fig. 11	Fig. 11	—
	Copper	—	—	Fig. 11	Fig. 11	Fig. 11
Sealing washer for stem	Aluminium	Fig. 12	Fig. 14	Fig. 14	Fig. 14	—
	Copper	Fig. 12	Fig. 14	Fig. 14	Fig. 14	Fig. 14
Separator	Aluminium	Fig. 15	Fig. 17	Fig. 17	Fig. 17	—
	Copper	Fig. 15	Fig. 16	Fig. 17	Fig. 17	Fig. 17
Vent plug	Aluminium	Fig. 18	Fig. 19	Fig. 19	Fig. 19	—
	Copper	—	Fig. 18	Fig. 19	Fig. 19	Fig. 19
Sealing washer for gene- ral purpose	Aluminium	Fig. 20	Fig. 22	Fig. 22	Fig. 22	—
	Copper	Fig. 20	Fig. 21	Fig. 21	Fig. 22	Fig. 22
Connec- ting lug	Aluminium	—	—	Fig. 23A	Fig. 23A	—
	Copper	—	—	Fig. 23B	Fig. 23B	Fig. 23B
Collar	Aluminium	—	Fig. 24	Fig. 24	Fig. 24	—
	Copper	—	—	Fig. 24	Fig. 24	Fig. 24
Gasket ring	Aluminium	—	Fig. 25B	Fig. 25B	Fig. 25B	—
	Copper	—	Fig. 25A	Fig. 25B	Fig. 25B	Fig. 25B
Retaining ring	Aluminium	—	Fig. 26	Fig. 26	Fig. 26	—
	Copper	—	—	Fig. 26	Fig. 26	Fig. 26
U-link ring	Aluminium	—	Fig. 27	Fig. 27	Fig. 27	—
	Copper	—	—	Fig. 27	Fig. 27	Fig. 27
T-bracket	Aluminium	—	Fig. 28	Fig. 28	Fig. 28	—
	Copper	—	—	Fig. 28	Fig. 28	Fig. 28



HEAD

BOLT

Dimension L shall be adjusted so that the overall length l_1 in Fig. 29 is obtained.

All dimensions in millimetres.

NOTE 1 — The threaded ends shall be chamfered in accordance with IS : 1368-1967*. The thread run-outs and undercuts shall be in accordance with IS : 1369-1975†.

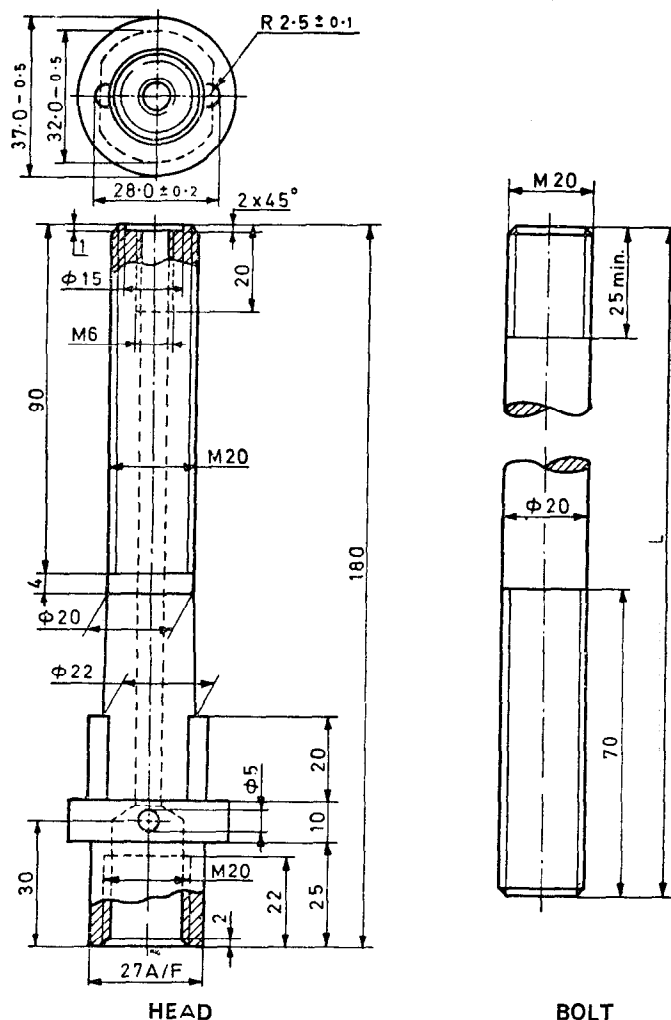
NOTE 2 — The corresponding porcelain part for this stem shall be 36 kV/250 A specified in Part V/Sec 1 of this standard.

NOTE 3 — Internal connections to the stem may also be made by means of flexible cable instead of using bolt. In such a case in place of threaded hole of M 12, a suitable hole required for the flexible cable may be made.

*Dimensions of ends of bolts and screws (first revision).

†Dimensions of screw thread run-outs and undercuts (first revision).

FIG. 1 STEM (FOR 36 kV/250 A RATING)



HEAD

BOLT

Dimension L shall be adjusted so that the overall length l_1 in Fig. 30 is obtained.

All dimensions in millimetres.

NOTE 1 — The threaded ends shall be chamfered in accordance with IS : 1368-1967*. The thread run-outs and undercuts shall be in accordance with IS : 1369-1975†.

NOTE 2 — The corresponding porcelain part for this stem shall be 36 kV/630 A specified in Part V/Sec 1 of this standard.

NOTE 3 — Internal connections to the stem may also be made by means of flexible cable in place of threaded hole of M 20, a suitable hole required for the flexible cable may be made.

*Dimensions of ends of bolts and screws (first revision).

†Dimensions of screw thread run-outs and undercuts (first revision).

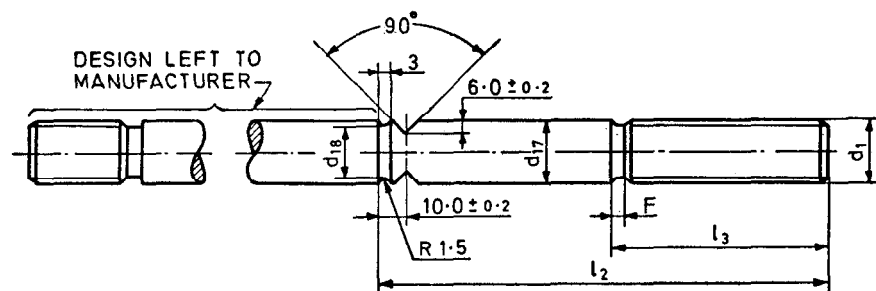
FIG. 2 STEM (FOR 36 kV/630 A RATING)

5. ASSEMBLY

5.1 For 36 kV/250 A Rating — The assembly of the bushing is shown in Fig. 29.

5.2 For 36 kV/630 A Rating — The assembly of the bushing is shown in Fig. 30.

5.3 For 36 kV/630, 1 000, 2 000 and 3 150 A Rating — The assembly of the bushing is shown in Fig. 31.



'F' according to IS : 1369-1975 Dimensions of screw thread run-outs and undercuts (first revision).

All dimensions in millimetres.

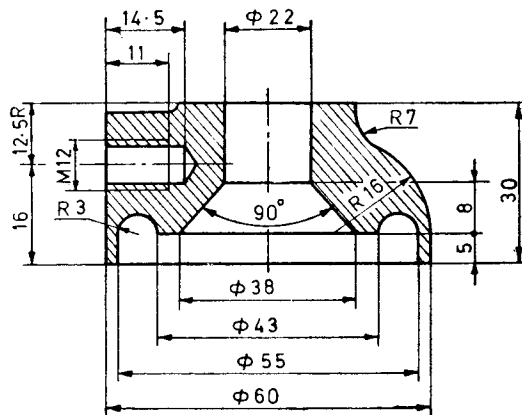
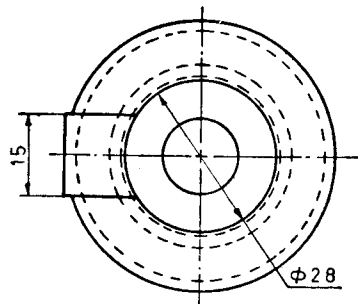
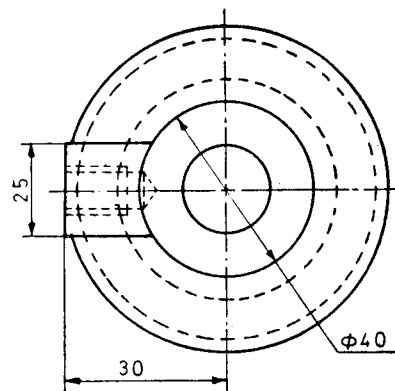
MATERIAL	BUSHING RATING kV/A	CORRESPOND- ING RATING OF PORCELAIN PART OF SEC 1 kV/A	d_1	d_{17}	d_{18}	l_2	l_3
Aluminium stem	36/630	36/1 000	M30×2	30	27	206	98
Copper stem	36/1 000	36/1 000	M30×2	30	27	206	98
Aluminium stem	36/1 000	36/2 000	M42×3	42	39	236	128
Copper stem	36/2 000	36/2 000	M42×3	42	39	236	128
Aluminium stem	36/2 000	36/3 150	M48×3	48	45	241	133
Copper stem	36/3 150	36/3 150	M48×3	48	45	241	133

NOTE—The threaded ends shall be chamfered in accordance with IS: 1368-1967*. The thread run-outs and undercuts shall be in accordance with IS: 1369-1975†.

*Dimensions of ends of bolts and screws (first revision).

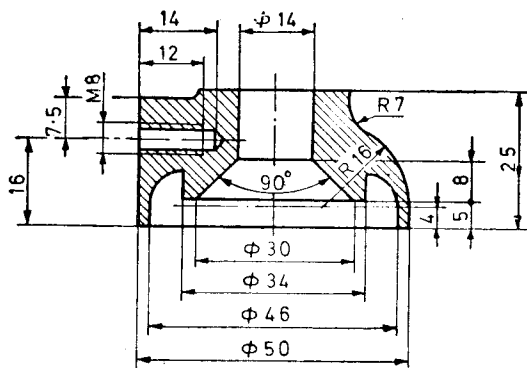
†Dimensions of screw thread run-outs and undercuts (first revision).

FIG. 3 STEM (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



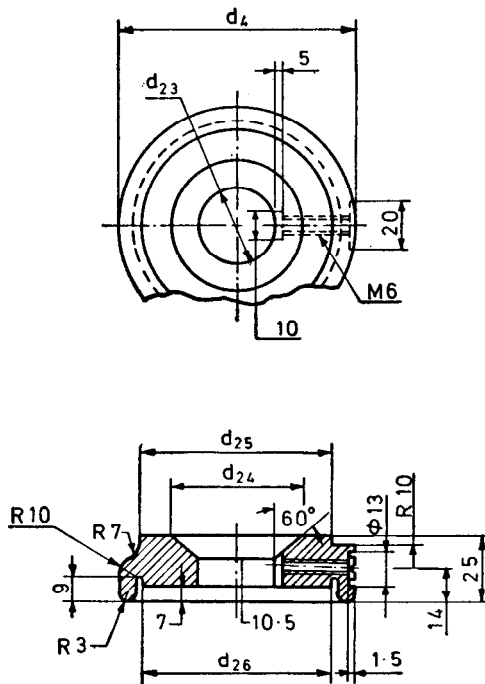
All dimensions in millimetres.

FIG. 5 CAP (FOR 36 kV/630 A RATING)



All dimensions in millimetres.

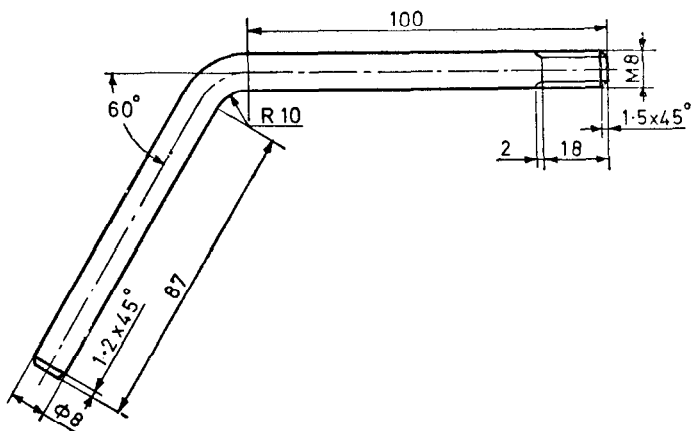
FIG. 4 CAP (FOR 36 kV/250 A RATING)



All dimensions in millimetres.

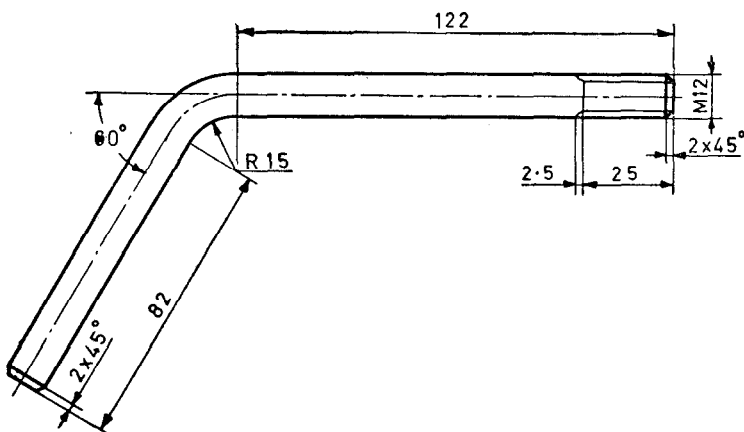
	BUSHING RATING kV/A	d_4	d_{23}	d_{24}	d_{25}	d_{26}
Aluminium stem	36/630	100	32	54	80	80
Copper stem	36/1 000	100	32	54	80	80
Aluminium stem	36/1 000	120	44	66	100	100
Copper stem	36/2 000	120	44	66	100	100
Aluminium stem	36/2 000	120	50	72	100	100
Copper stem	36/3 150	120	50	72	100	100

FIG. 6 CAP (FOR 36 kV/630, 1 000, 2 000 AND 3150 A RATING)



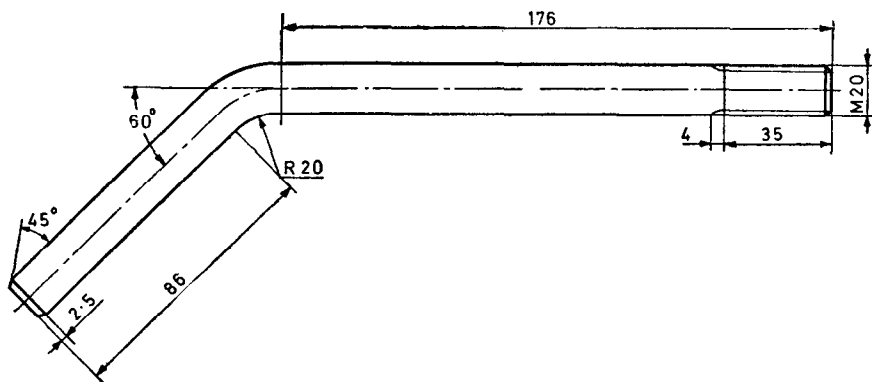
All dimensions in millimetres.

FIG. 7 UPPER SPARK GAP HORN (FOR 36 kV/250 A RATING)



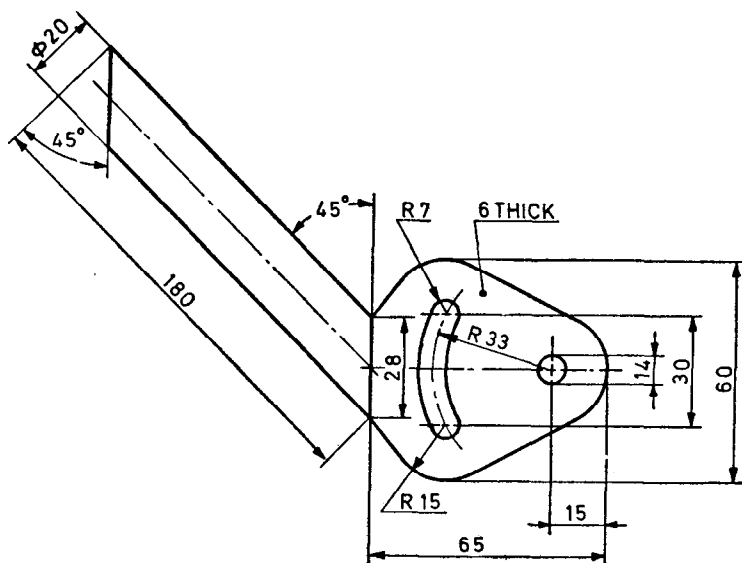
All dimensions in millimetres.

FIG. 8 UPPER SPARK GAP HORN (FOR 36 kV/630 A RATING)



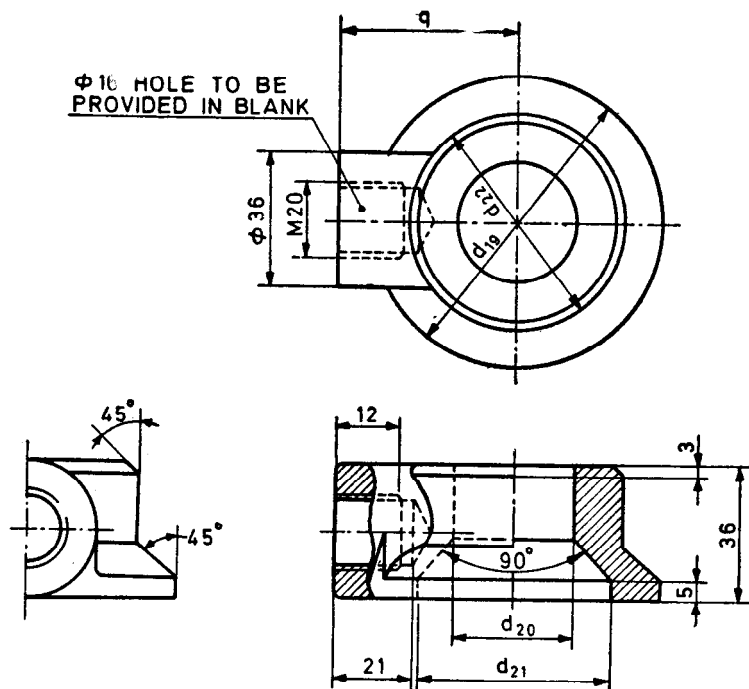
All dimensions in millimetres.

FIG. 9 UPPER SPARK GAP HORN (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



All dimensions in millimetres.

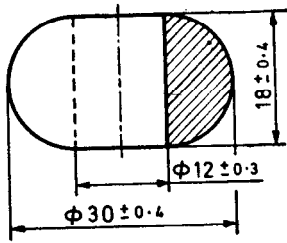
FIG. 10 LOWER SPARK GAP HORN (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



All dimensions in millimetres.

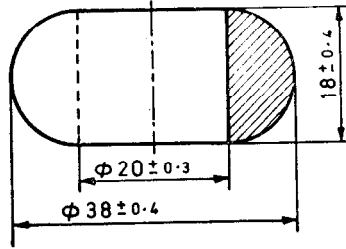
BUSHING RATING kV/A	FOR BUSHING WITH ALUMINIUM STEM					FOR BUSHING WITH COPPER STEM				
	d_{19}	d_{20}	d_{21}	d_{22}	q	d_{19}	d_{20}	d_{21}	d_{22}	q
36/630	80	32	54	60	50	—	—	—	—	—
36/1 000	100	44	66	80	55	80	32	54	60	50
36/2 000	100	50	72	90	60	100	44	66	80	55
36/3 150	—	—	—	—	—	100	50	72	90	60

FIG. 11 SPARK-GAP HORN CARRIER (FOR 36 kV/630, 1 000, 2 000
AND 3 150 A RATING)



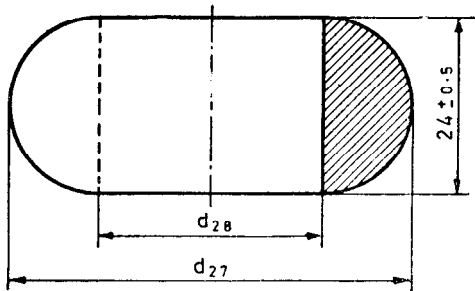
All dimensions in millimetres.

FIG. 12 SEALING WASHER FOR
STEM (FOR 36 kV/250 A RATING)



All dimensions in millimetres.

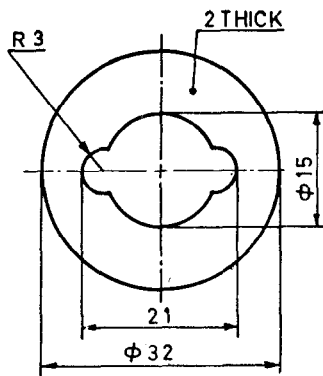
FIG. 13 SEALING WASHER FOR
STEM (FOR 36 kV/630 A RATING)



All dimensions in millimetres.

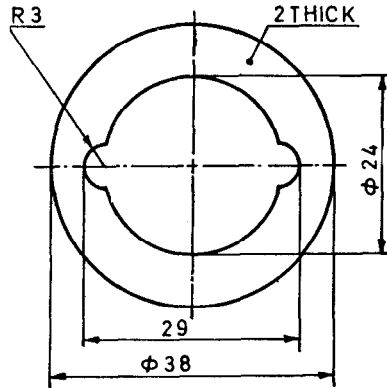
BUSHING RATING	BUSHING WITH ALUMINIUM STEM		BUSHING WITH COPPER STEM	
	$d_{27} \pm 0.5$	$d_{28} \pm 0.3$	$d_{27} \pm 0.5$	$d_{28} \pm 0.3$
36/630	54	30	—	—
36/1 000	66	42	54	30
36/2 000	72	48	66	42
36/3 150	—	—	72	48

FIG. 14 SEALING WASHER FOR STEM (FOR 36 kV/630, 1 000, 2 000
AND 3 150 A RATING)



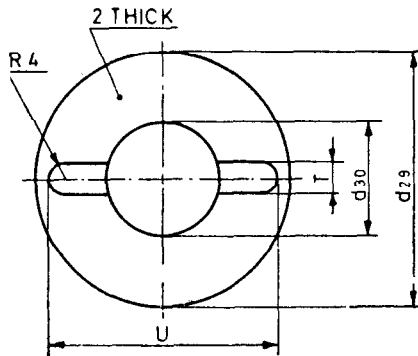
All dimensions in millimetres.

FIG. 15 SEPARATOR (FOR 36 kV/250 A RATING)



All dimensions in millimetres.

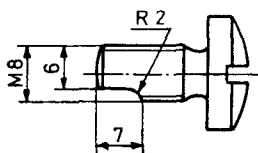
FIG. 16 SEPARATOR (FOR 36 kV/630 A RATING)



All dimensions in millimetres.

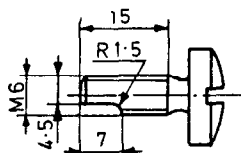
BUSHING RATING	BUSHING WITH ALUMINIUM STEM				BUSHING WITH COPPER STEM			
kV	d_{29}	d_{30}	T	U	d_{29}	d_{30}	T	U
36/630	56	32	12	48	—	—	—	—
36/1 000	70	50	17	62	56	32	12	48
36/2 000	70	50	17	62	70	50	17	62
36/3 150	—	—	—	—	70	50	17	62

FIG. 17 SEPARATOR (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



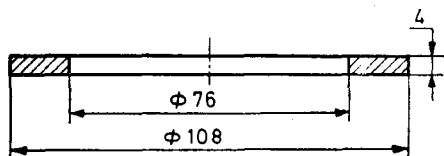
All dimensions in millimetres.

FIG. 18 VENT PLUG (FOR 36 kV/630 A RATING)



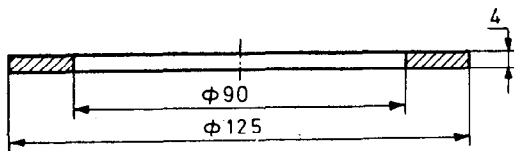
All dimensions in millimetres.

FIG. 19 VENT PLUG (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



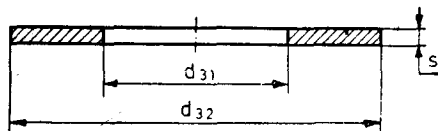
All dimensions in millimetres.

FIG. 20 SEALING WASHER FOR GENERAL PURPOSE (FOR 36 kV/250 A RATING)



All dimensions in millimetres.

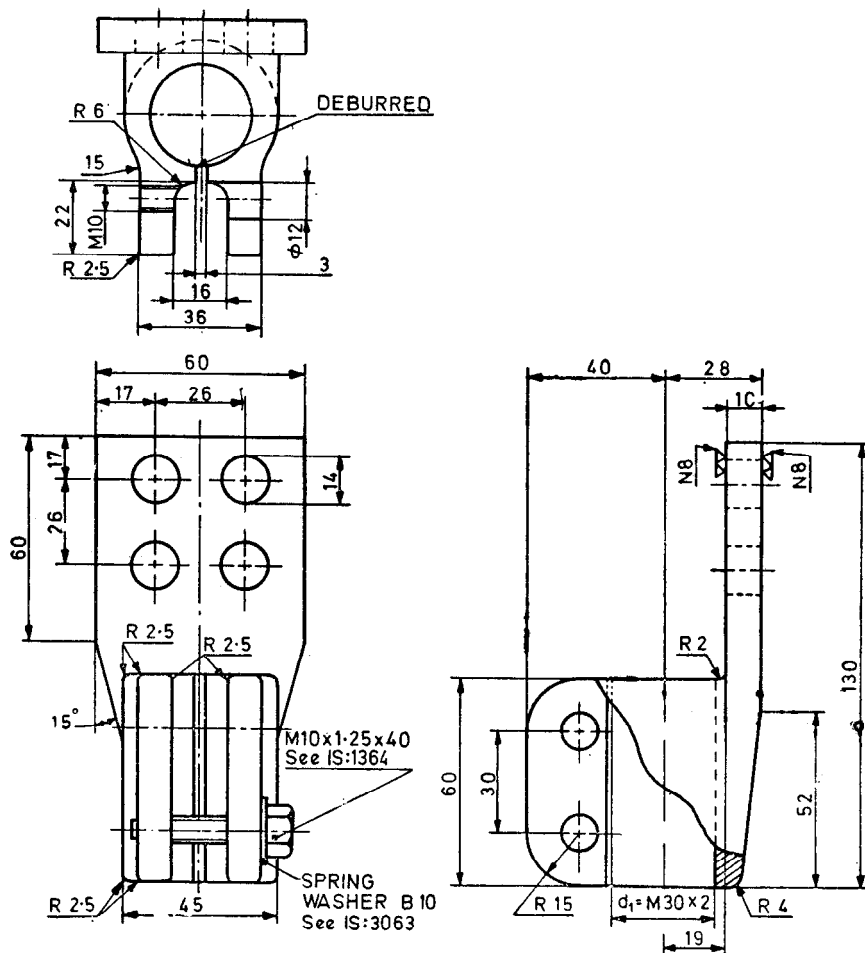
FIG. 21 SEALING WASHER FOR GENERAL PURPOSE (FOR 36 kV/630 A RATING)



All dimensions in millimetres.

BUSHING RATING kV/A	TYPE	BUSHING WITH ALUMINIUM STEM			BUSHING WITH COPPER STEM		
		d_{32}	d_{31}	s	d_{32}	d_{31}	s
36/630	M	80	36	2	—	—	—
	N	160	110	4	—	—	—
36/1 000	M	100	50	2	80	36	2
	N	180	135	4	160	110	4
36/2 000	M	100	50	2	100	50	2
	N	180	135	4	180	135	4
36/3 150	M	—	—	—	100	50	2
		—	—	—	180	135	4

FIG. 22 SEALING WASHER FOR GENERAL PURPOSE (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



FORM A

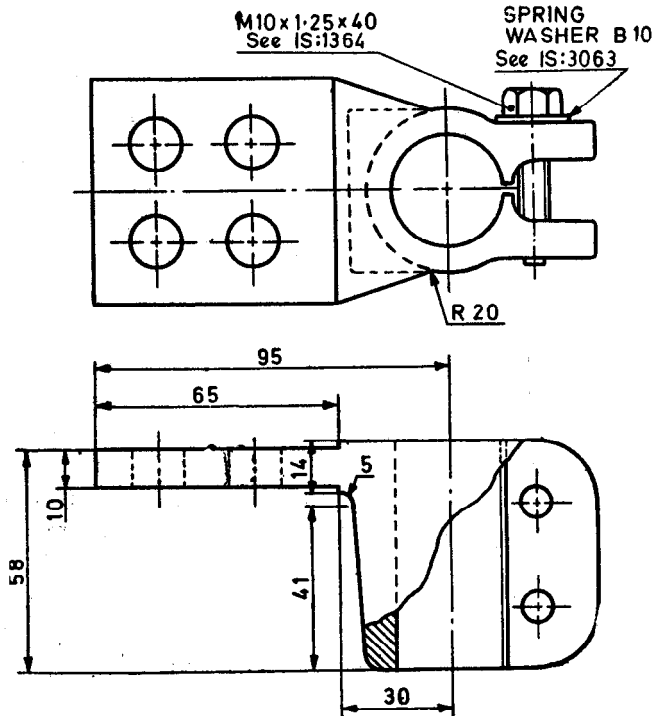
Tolerance on dimensions:

For machine parts	— medium	} (see IS : 2102-1969*)
Other parts	— coarse	

*Specification for allowable deviations for dimensions without specified tolerances (first revision).

All dimensions in millimetres.

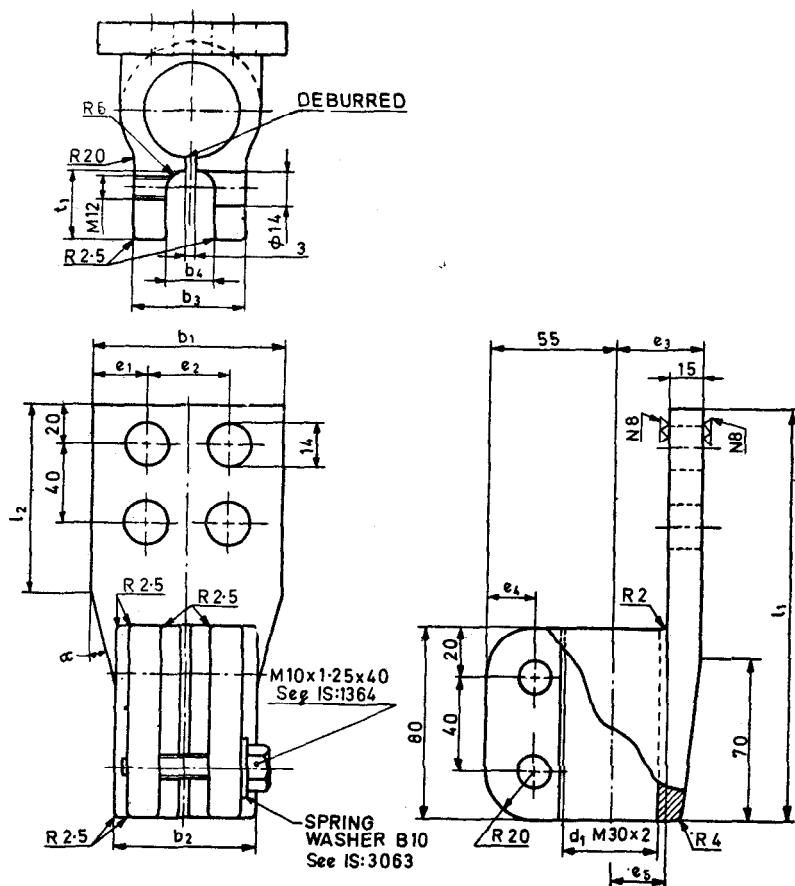
FIG. 23(A) CONNECTING LUG (FOR 36 kV/1 000 A RATING) — Contd



FORM B

All dimensions in millimetres.

FIG. 23(A) CONNECTING LUG (FOR 36 kV/1 000 A RATING)



FORM A

All dimensions in millimetres.

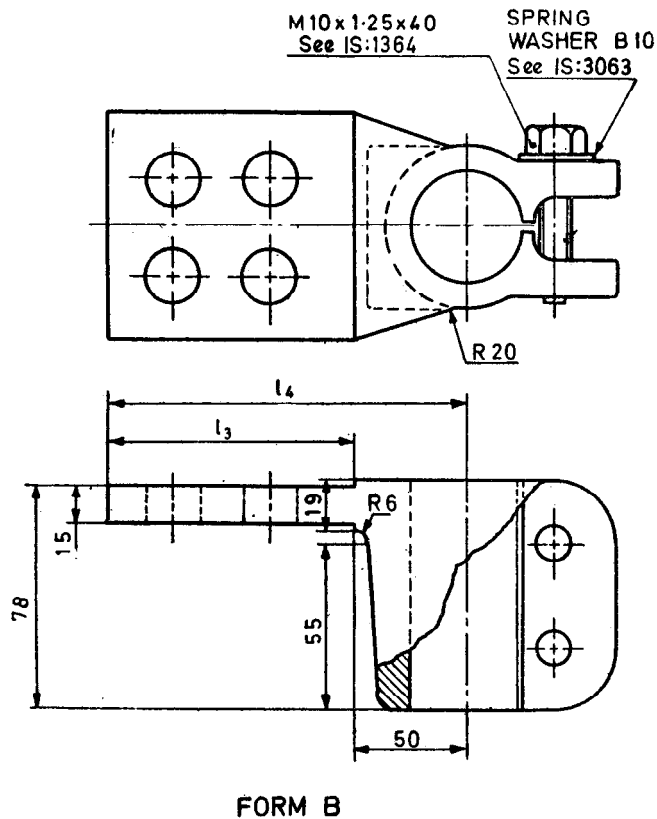
STEM SIZE	d_1	b_1	b_2	b_3	b_4	e_1	e_2	e_3	e_4	e_5	l_1	l_2	l_3	l_4	t_1	α	FOR NOMINAL CURRENT RATING
M 42 \times 3	M 42 \times 3	100	58	45	20	25	50	40	18	25	190	100	105	155	26	26°	2 000 A
M 48 \times 3	M 48 \times 3	120	68	58	28	30	60	45	20	30	210	120	125	175	28	30°	3 150 A

Tolerance on dimensions:

For machine parts — medium
Other parts — coarse } (see IS : 2102-1969*)

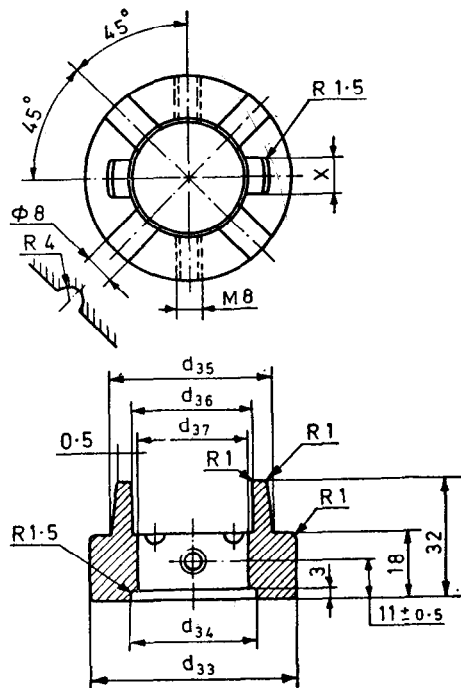
*Specification for allowable deviation for dimensions without specified tolerances (first revision).

FIG. 23(B) CONNECTING LUG (FOR 36 kV/2 000 AND 3 150 A RATING) — Contd



All dimensions in millimetres.

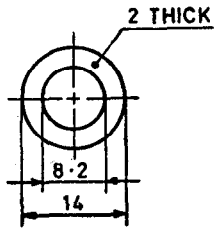
FIG. 23(B) CONNECTING LUG (FOR 36 kV/2 000 AND 3 150 A RATING)



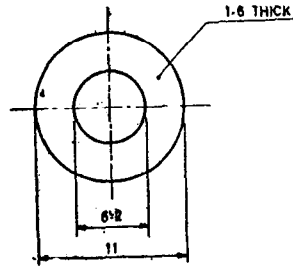
All dimensions in millimetres.

BUSHING RATING	BUSHING WITH ALUMINIUM STEM						BUSHING WITH COPPER STEM					
	d_{33}	d_{34}	d_{35}	d_{36}	d_{37}	x	d_{33}	d_{34}	d_{36}	d_{36}	d_{37}	x
kV/A												
36/630	56	34	44	33	30.7	10	—	—	—	—	—	—
36/1 000	70	46	60	50	42.7	15	56	34	44	33	30.7	10
36/2 000	70	52	60	50	48.7	15	70	46	60	50	42.7	15
36/3 150	—	—	—	—	—	—	70	52	60	50	48.7	15

FIG. 24 COLLAR (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



25 A



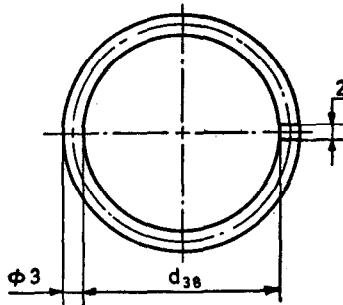
25 B

All dimensions in millimetres.

Tolerance on dimensions — Coarse (see IS : 2102-1969*).

*Specification for allowable deviations for dimensions without specified tolerances (first revision).

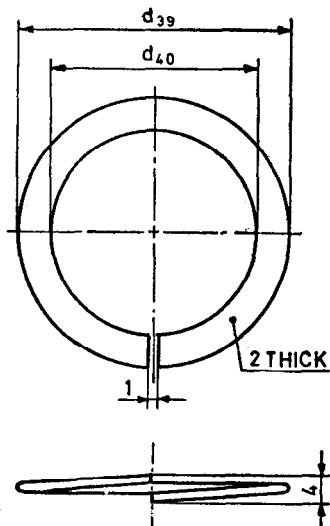
FIG. 25 GASKET RING (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



All dimensions in millimetres.

BUSHING RATING kV/A	BUSHING WITH ALUMINIUM STEM		BUSHING WITH COPPER STEM	
	d_{38}	Stretched Length	d_{38}	Stretched Length
36/630	27	92.4	—	—
36/1 000	39	130	27	92.4
36/2 000	45	152	39	130
36/3 150	—	—	45	152

FIG. 26 RETAINING RING (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



All dimensions in millimetres.

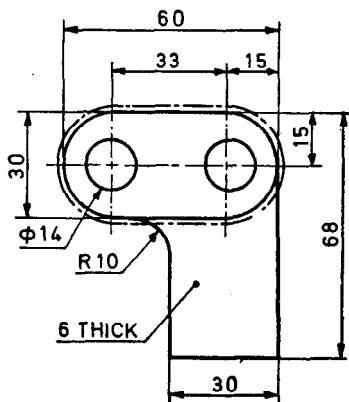
BUSHING RATING
kV/A

BUSHING WITH
ALUMINIUM STEM

BUSHING WITH
COPPER STEM

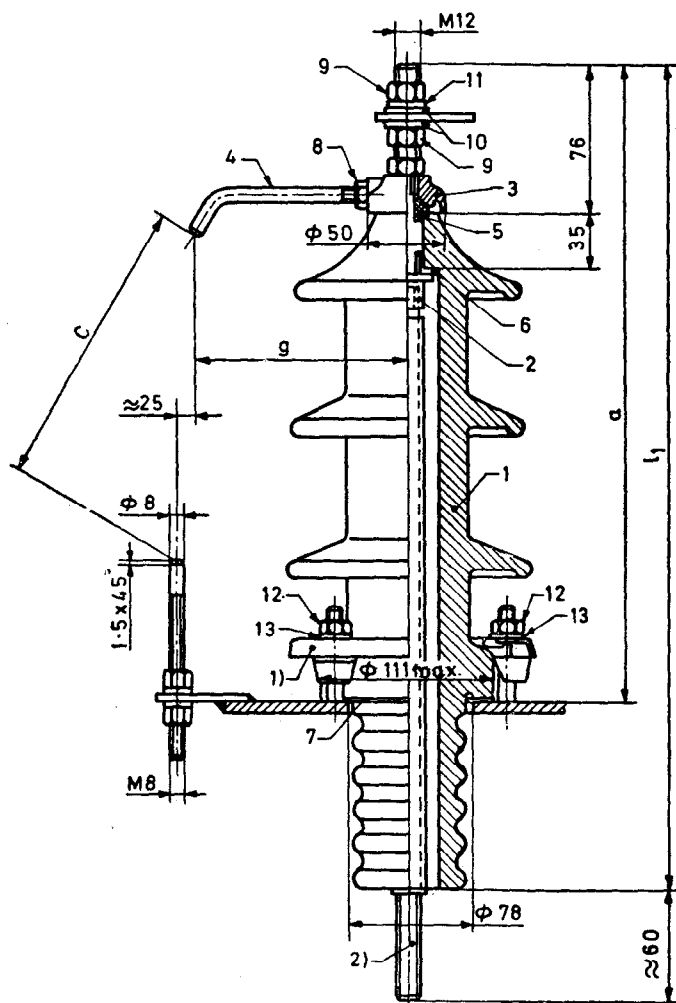
	d_{39}	d_{40}	d_{39}	d_{40}
36/630	76	58	—	—
36/1 000	96	70	76	58
36/2 000	96	76	96	70
36/3 150	—	—	96	76

FIG. 27 U-LINK RING (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



All dimensions in millimetres.

FIG. 28 T-BRACKET (FOR 36 kV/630, 1 000, 2 000 AND 3 150 A RATING)



All dimensions in millimetres.

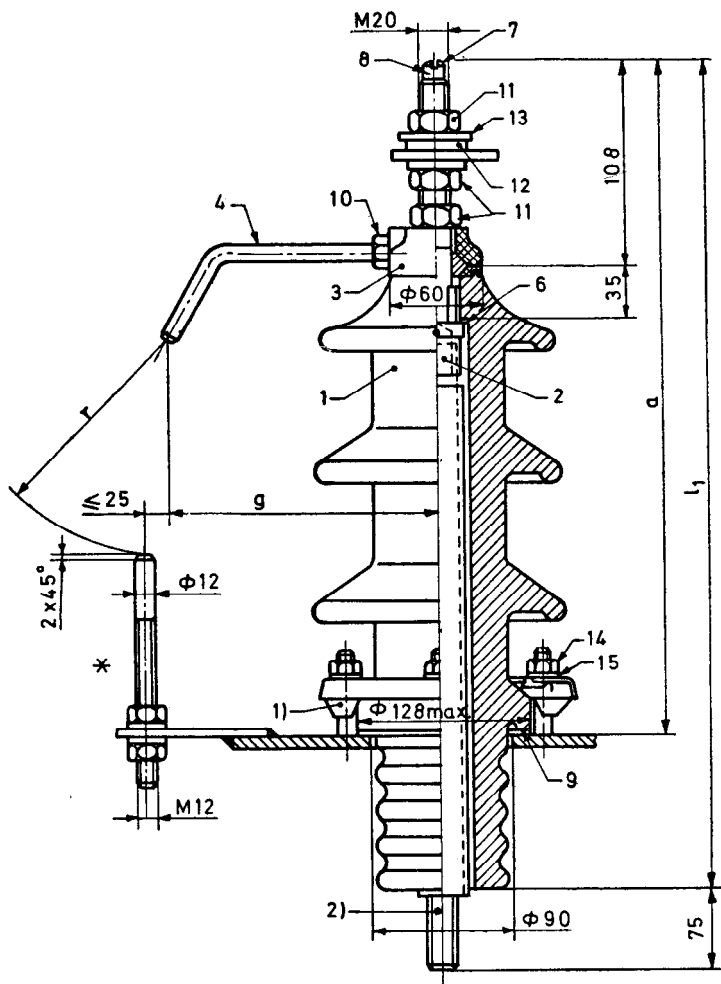
BUSHING RATING
36/250 kV/A

<i>a</i>	<i>c</i>	<i>g</i>	<i>l₁</i>
485	220	170	561

PARTS NOMENCLATURE

- | | | |
|------------------------|--------------------------------------|-------------------|
| 1. Insulator | 6. Separator | 10. Plain washer |
| 2. Stem | 7. General purpose
sealing washer | 11. Spring washer |
| 3. Cap | 8. Hexagonal nut | 12. Hexagonal nut |
| 4. Arcing horn | 9. Hexagonal nut | 13. Plain washer |
| 5. Sealing washer stem | | |

FIG. 29 BUSHING ASSEMBLY



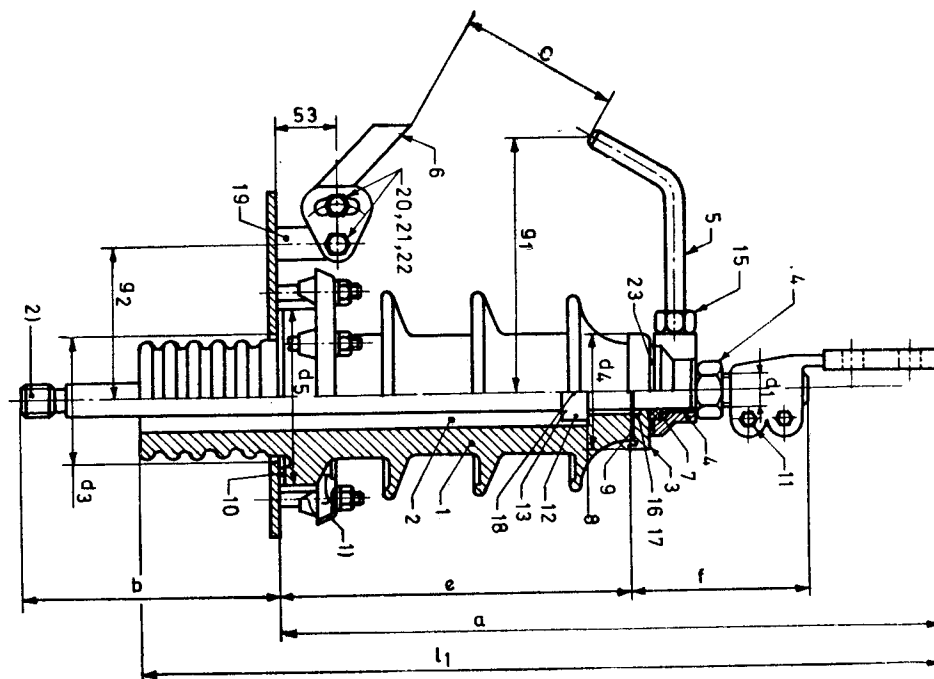
All dimensions in millimetres.

BUSHING RATING	a	r	g	l_1
36/630 kV/A	522	220	200	618

PARTS NOMENCLATURE

- | | | |
|----------------------------|--|-------------------|
| 1. Insulator | 7. Vent plug | 12. Washer |
| 2. Stem | 8. Gasket ring | 13. Spring washer |
| 3. Cap | 9. General purpose for
sealing washer | 14. Hexagonal nut |
| 4. Arcing horn | 10. Hexagonal nut | 15. Washer |
| 5. Sealing washer for stem | 11. Hexagonal nut | |
| 6. Separator | | |

FIG. 30 BUSHING ASSEMBLY WITH COPPER STEM



BUSHING RATING kV/A	a	b	c	d ₁	d ₃	d ₄	d ₅	e	f	g ₁	g ₂	l ₁
Bushing with aluminium stem { 36/620	635	198	220	M30×2	110	100	163	419	138	285	138	756
{ 36/1 000	710	198	220	M42×3	135	120	183	419	178	290	148	831
{ 36/2 000	740	198	220	M48×3	135	120	183	419	183	295	148	861
Bushing with copper Stem { 36/1 000	635	198	220	M30×2	110	100	163	419	138	285	138	756
{ 36/2 000	710	198	220	M42×3	135	120	183	419	178	290	148	831
{ 36/3 150	740	198	220	M48×3	135	120	183	419	183	295	148	861

PARTS NOMENCLATURE

- | | | |
|----------------------------|--|--------------------|
| 1. Insulator | 9. Sealing washer for general purpose | 17. General washer |
| 2. Stem | 10. Sealing washer for general purpose | 18. Washer |
| 3. Cap | 11. Connecting lug | 19. T-bracket |
| 4. Spark-gap horn carrier | 12. Collar | 20. Bolt |
| 5. Upper spark gap horn | 13. Retaining ring | 21. Nut |
| 6. Lower spark gap horn | 14. Hexagonal nut | 22. Ring |
| 7. Sealing washer for stem | 15. Hexagonal nut | 23. U-ring |
| 8. Separator | 16. Vent plug | |

All dimensions in millimetres.

FIG. 31 BUSHING ASSEMBLY

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AMENDMENT NO. 1 OCTOBER 1987**TO****IS : 3347 (Part 5/Sec 2)- 1979 DIMENSIONS FOR
PORCELAIN TRANSFORMER BUSHINGS FOR USE
IN NORMAL AND LIGHTLY POLLUTED
ATMOSPHERES****PART 5 36 kV BUSHINGS****Section 2 Metal Parts****(First Revision)**

(Page 10, Table 1, sixth and tenth entries) — Substitute the following for the existing details for parts:

Sealing washer for stem	Aluminium Copper	Fig. 12 Fig. 12	Fig. 14 Fig. 13	Fig. 14 Fig. 14	Fig. 14 Fig. 14	— Fig. 14
Connecting lug	Aluminium Copper	— —	— —	Fig. 23(B) Fig. 23(A)	Fig. 23(B) Fig. 23(B)	— Fig. 23(B)

[Page 22, Fig. 23(A), Form A]:

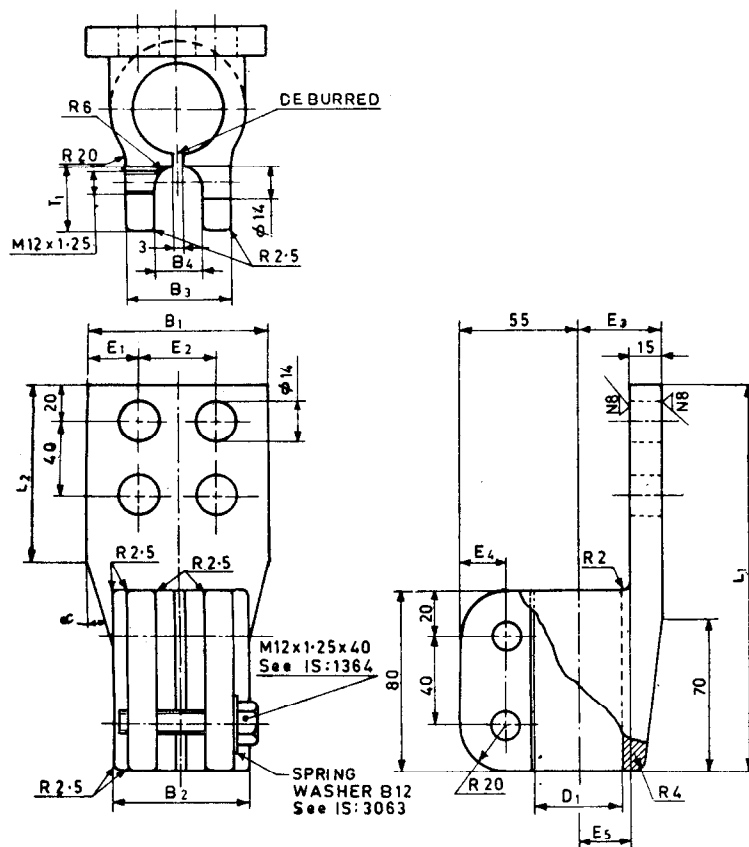
- Substitute 'M10 × 1.25' for 'M10' in left top diagram.
- Delete 'd₁' in right side diagram.

[Page 23, Fig. 23(A), Form B] — Add the following Note above the caption:

'NOTE — For other details, refer to Fig. 23(A), Form A,'

Gr 1

[Page 24, Fig. 23(B), Form A] — Substitute the following figure for the existing figure:



FORM A

STEM SIZE	D_1	B_1	B_2	B_3	B_4	E_1	E_2	E_3	E_4	E_5	L_1	L_2	L_3	L_4	T_1	α	FOR NOMINAL CURRENT RATING
M 42 × 3	M 42 × 3	100	58	45	20	25	50	40	20	25	190	100	105	155	26	26°	2 000 A
M 48 × 3	M 48 × 3	120	68	58	28	30	60	45	18	30	210	120	125	175	28	30°	3 150 A

Tolerance on dimensions:

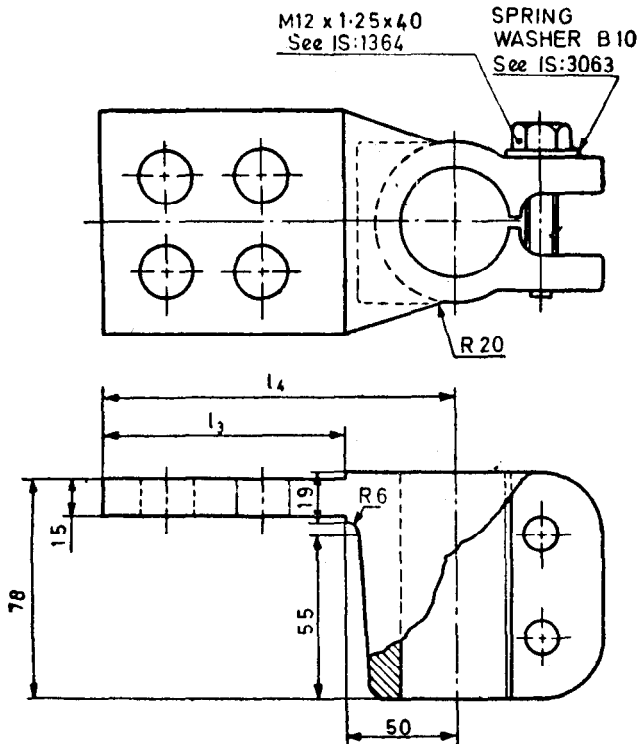
For machine parts — medium } (See IS : 2102-1969*)
Other parts — coarse

*Specification for allowable deviation for dimensions without specified tolerances (first revision).

All dimensions in millimetres.

FIG. 23(B) CONNECTING LUG (FOR 36 kV/2 000 AND 3 150 A RATING)

[Page 25, Fig. 23(B), Form B] — Substitute the following figure for the existing figure:



FORM B

All dimensions in millimetres.

NOTE — Let other details refer to Fig. 23(B), Form A.

FIG. 23(B) CONNECTING LUG (FOR 36 kV/2 000 AND 3 150 A RATING)

(Page 28, Fig. 28) — Add the following Note above the caption of the figure:

‘NOTE — The surface marked with dotted lines should be tinned or electroplated but not painted.’

[illegible]

1. Clamping arrangement of bushings shall be according to IS : 4257 (Part 1)-1981*.
2. The connecting bolt and the stem may be made in one piece.

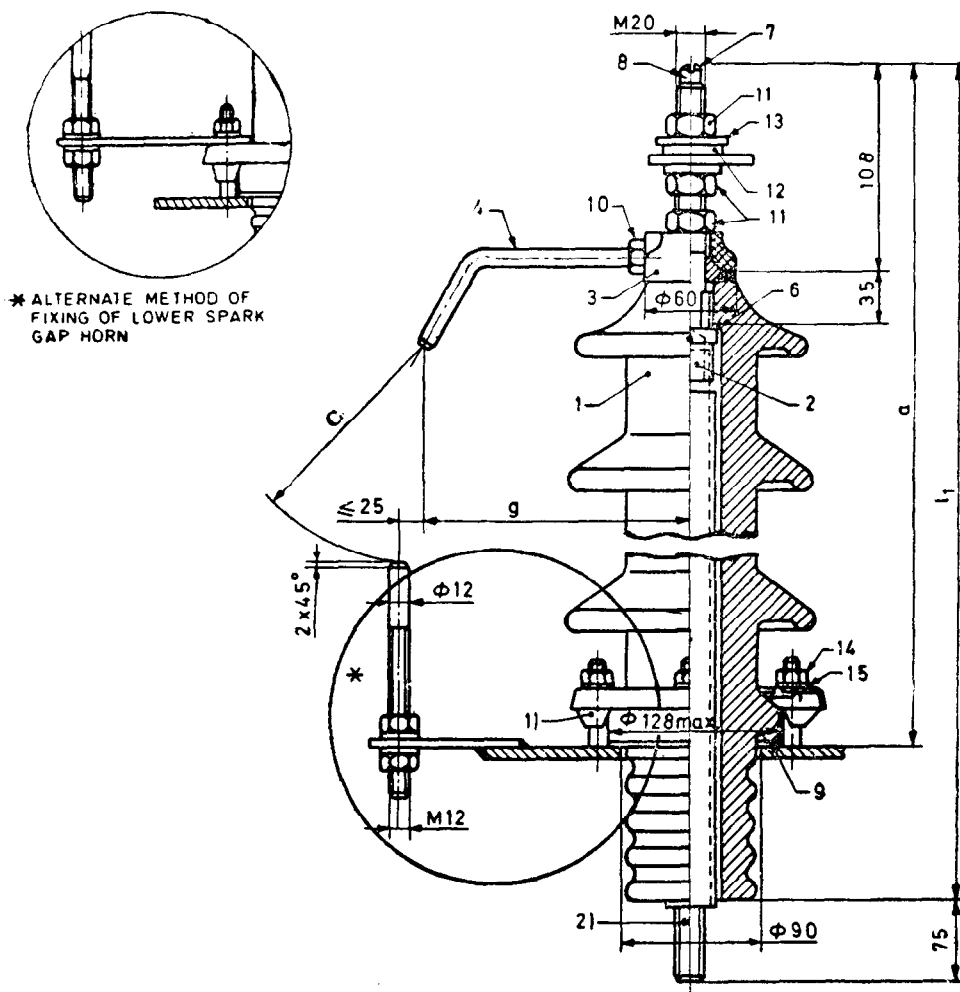
BUSHING RATING kV/A	<i>a</i>	<i>C</i>	<i>g</i>	<i>l₁</i>
36/250	485	220	170	561

1. Insulator
2. Stem
3. Cap
4. Upper spark gap horn
5. Sealing washer for stem
6. Separator
7. Sealing washer for general purpose
8. Hexagonal nut
9. Hexagonal nut
10. Plain washer
11. Spring washer
12. Hexagonal nut
13. Plain washer

All dimensions in millimetres.

FIG. 29 BUSHING ASSEMBLY (FOR 36 kV/250 A RATING)

(Page 30, Fig. 30) — Substitute the following[®] new figure for the existing figure:



Alternate arrangement for fixing of lower spark gap horn may be used.

1. Clamping arrangement of bushings shall be according to IS: 4257 (Part 1)-1981*.
2. The connecting bolt and the stem may be made in one piece.

BUSHING RATING kV/A	a	C	g	l ₁
36/630	522	220	200	618

Parts Nomenclature

1. Insulator	6. Separator	10. Hexagonal nut
2. Stem	7. Vent plug	11. Hexagonal nut
3. Cap	8. Gasket ring	12. Washer
4. Upper spark gap horn	9. Sealing washer for general purpose	13. Spring washer
5. Sealing washer for stem		14. Hexagonal nut
		15. Washer

*Dimensions for clamping arrangement for porcelain transformer bushings: Part 1 For 12 kV to 36 kV bushings (first revision).

All dimensions in millimetres.

FIG. 30 BUSHING ASSEMBLY WITH COPPER STEM
(FOR 36 kV/630 A RATING)

(Page 31, Fig. 31):

a) *Sl No. 22* — Substitute 'Plain washer' for 'Ring'.

b) *Against '1' marked in the middle of the diagram* — Add the following new matter:

“1) The clamping arrangement of bushing shall be according to IS : 4257 (Part 1)-1981 'Dimension for clamping arrangement for porcelain transformer bushings: Part 1 For 12 kV to 36 kV bushings (*first revision*)'.”

c) *Delete* — '2)' marked on the stem in the left top diagram.

(ETDC 3)

AMENDMENT NO. 2 FEBRUARY 1989
TO
IS : 3347 (Part 5/Sec 2) - 1979 DIMENSIONS FOR
PORCELAIN TRANSFORMER BUSHINGS FOR USE
IN NORMAL AND LIGHTLY POLLUTED
ATMOSPHERES

PART 5 36 kV BUSHINGS

Section 2 Metal Parts

(First Revision)

(First cover, pages 1 and 3, title) — Substitute the following for the existing title:

‘Indian Standard

DIMENSIONS FOR PORCELAIN TRANSFORMER
BUSHINGS FOR USE IN LIGHTLY POLLUTED
ATMOSPHERES

Part 5 36 kV BUSHINGS

Section 2 Metal Parts

(First Revision)’

(Page 3, clause 0.2, first and second line) }
(Page 5, clause 1.1, second line) } — Delete the words
‘normal and’.

(ETDC 3)